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AUTHOR Rushby, N. J.
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ABSTRACT

A brief review is provided of the strategy, information services, seminars, demonstrations, software acquisition policy, educational development, and cooperative efforts of the CEDAR Project, which aims to encourage and facilitate the development and effective use of educational computing within Imperial College, the University of London, and elsewhere. Included are lists of 18 publications and reports from the project and 14 papers published in journals, and an extensive bibliography of reports on the evaluation of educational computing programs is appended. Use of the CEDAR online enquiry services is discussed in terms of the CEDAR bibliography; the computer assisted learning (CAL) package index; searching the catalogs; logging onto the computer and the man-machine dialogue; running the enquiry program, including enquiry program directives, i.e., the feature directive, the list directive, and finish and stop directives, and giving an example of a complete enquiry session; and adding to the catalogs. (RBF)

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THE CEDAR PROJECT

February 1981

by N.J.Rushby

and

EVALUATION OF CBL: A BIBLIOGRAPHY

January 1981

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THE CEDAR PROJECT

1. INTRODUCTION

This is not an appropriate place to advance and develop the argument for and against educational computing in all its aspects. Suffice it to say here that teachers are faced with many and various problems relating to their teaching and their students' learning. Highly structured courses to meet the particular needs of individual students pose problems of instruction; modular course structures with more sophisticated assessment methods pose problems of student management; student centred courses pose problems of resource management; necessary practical experience may be time consuming, expensive, or impossibly dangerous. Educational technology, in its widest sense provides teachers with methods and tools which, properly applied, can alleviate some of these problems. The computer is one of these tools - but only one. True, it is a most powerful, and for some a charismatic tool, but its efficiency depends on its proper application.

The broad aim of the CEDAR Project is to encourage and facilitate the development and effective use of educational computing within Imperial College, the University of London, and elsewhere. The project supports teaching staff by providing an information service and demonstration facilities, by developing and implementing educational computer programs and by assisting with educational development and training.

2. STRATEGY

Previous experiences with many forms of educational innovation, including educational computing, have shown that the 'successful' innovations are those driven by the teachers themselves, rather than those imposed on them from above, by administrators or detached research and development teams. House identifies this as a major reason for the poor impact of computer assisted learning in the USA in the 1970s (House 1974). Further evidence comes from the many evaluation studies of the National Development Programme in Computer Assisted Learning (NDPCAL) projects in the UK.

Hence the Project strategy is to encourage teachers to examine the possibilities of educational computing, to recognise its contribution as a solution to some of their problems, and then to facilitate the development of appropriate educational tools. There is an important distinction here between support, which is passive, and encouragement, which is very active. Both are necessary.

3. INFORMATION

The CEDAR Information Service on the Use of Computers in Education and Training is supported by the Council for Educational Technology who have funded the appointment of a full time information officer.

The project provides a variety of information about the milieu of educational computing, such as:

- general descriptions of computer assisted and computer managed learning,
- descriptions of specific educational computing projects,
- the implications of educational computing for curriculum design and assessment,
- technology associated with educational computing.

The enquiry service is founded on two databases kept on the main College computer, which hold details of books, reports and papers on computer based learning and related topics, and details of computer assisted learning packages available in the UK. These catalogues are published in microfiche together with a keyword in context (KWIC) index, and can be searched on-line using a computer terminal and a simple enquiry program.

The CEDAR bibliography is a collection of references to books, papers and reports on educational computing. It includes references on computer assisted and computer managed learning, simulation, student record keeping, educational and management implications and some fringe references on related topics that are considered useful. The references are drawn from the UK, North America, Europe, the Soviet Union, India and Australia.

Many of these publications are held in the CEDAR collection in the College Library, and are available on loan to members of the College and to other libraries.

The CAL Package Index is a comprehensive list of references to CAL programs available in the UK. The initial sources include most of the educational computer centres in the UK, who have supplied details of CAL programs in their libraries, a number of program exchange catalogues, and some other existing program indices. Periodically, the index is brought up to date with details of new and changed programs.

The data held on each program is not exhaustive, but should be sufficient to enable a user to see whether it is likely to be suitable for his needs. It includes a brief description of the program with the subject and the type of students for whom it was written. There are notes on the programing language and any special peripherals, eg graphics terminals, that may be used. Finally, the entry includes a contact address from whence further details may be obtained.

A full description of the enquiry service is given in the Imperial College Computer Centre bulletin 'Information on computers in education and training.' Copies of this, the CEDAR Bibliography, CAL Package Index, and their associated KWIC indexes, are available from the Project.

4. SEMINARS

The Project arranges a series of seminars on various aspects of educational computing. Where appropriate, these may be in collaboration with the Education Forum, the Department of Computing and Control, or other departments in the College. The seminars, which are given by guest speakers from the United Kingdom and overseas, are open to all interested parties.

5. DEMONSTRATIONS

The Project supports a small demonstration facility which enables interested teachers to experience various aspects of educational computing

For the demonstration to have relevance it must consist of more than an exhibition of the technology. Ideally it should involve the teacher working through a section of the course related to his (or her) own interests. This may well involve other media, eg student notes or tape slide, to complement the computer based materials.

6. SOFTWARE

The resources of the CEDAR Project are limited and hence comparatively little effort is expended in developing new software. Rather, the resources are directed towards importing existing software and the associated educational materials from other computer assisted learning projects, and adapting them as necessary to meet local needs. The management of resources is discussed in Section 9. There is, of course, a wealth of material available from the projects sponsored by NDPCAL, most of which is available free or for a minimal charge to educational institutions in the UK (see James 1977 and NDPCAL 1977). CEDAR is an active participant in these activities. Most computer assisted learning projects are happy to see and assist other institutions using their materials and CEDAR maintains continual contact with similar organisations in the UK and overseas.

The CEDAR Project works closely with other parts of the Computer Centre, particularly with the Applications Programming Group which is responsible for CAL software development, with the Department of Computing and Control, and with other departments within the College, to investigate, develop and exploit various aspects of computer hardware and software technology relevant to educational computing. Problems highlighted by CEDAR may provide fruitful areas for research, with the Project acting as a test bed for ensuing development.

7. EDUCATIONAL DEVELOPMENT

There is a tendency in educational technology for the education to be forgotten in the delights of the technology. The teacher, however, is facing educational problems and it is undesirable that these should merely be replaced by technological ones. The technological problems of computer assisted and computer managed learning have been identified and, by and large, we now have workable, if not optimal, solutions. Much less is understood about the educational implications, the effects on the curriculum and assessment, or the most effective way of using this technology for the lecturer or teacher. Although considerable research has been done, the techniques in a useable form have not yet filtered down to the chalkface. There is a need for inservice appreciation courses, to enable teachers to recognise the possibilities and limitations of educational computing in relation to some of their problems.

This need exists, not only within the College, but also in many other educational and training institutions. CEDAR provides support in the form of personal advice from members of the College Computer Centre who have had considerable practical experience of computer based learning and can relate the techniques to a variety of learning problems. The Project can also provide short courses, lasting perhaps for two afternoon sessions, for College staff and other interested parties. This aspect of the Project is being developed further, providing a useful service to the educational community in general and to industry.

8. COLLABORATION

Wherever appropriate, the CEDAR Project endeavours to work with other organisations involved in educational computing, both within and outside the College. It has established and maintains contacts with computer assisted learning projects in the UK, Europe and overseas, exchanging information and expertise. Visitors from other projects are invited to give seminars which are open to all those who are interested. There are also facilities for accommodating academic visitors on sabbatical leave.

There is considerable scope for collaboration with industry, to develop new methods and expertise for management and skills training. The possibilities of inservice appreciation courses have already been noted in section 7.2. A study of the future for computer assistance in industrial training (Miles 1977) urges that there should be a centre, competent to give authoritative and impartial advice to prospective users of computer based training systems. CEDAR can provide such support for industry.

9. MANAGEMENT

As with many other educational technologies, the development of

courses which use the computer as a quasi-teacher, as a manager or as a simulator, requires resources of people and facilities. These resources are limited and this adds necessity to the desirability of using them to the best effect.

Functionally, CEDAR is divided into three parts. The enquiry service, although based on the main College Computer, is centred on the Lyon Playfair Library which houses the CEDAR collection of books, papers and reports on CAL and related topics. The software support is provided by the Applications Programming Group in the Computer Centre. The third function, the educational development and consultancy central to the Project, is provided by members of the Computer Centre who are experienced in computer assisted and computer managed learning.

10. REFERENCES

House, E.R. (1974) "The politics of educational innovation" McCutchan Publishing Corporation, California.

James, E.B. (1977) "Computers in university education" Internal report, Imperial College London. January 1977.

Leiblum, M.D. (1977) "A pragmatic approach to initiating a computer assisted instruction service and some problems involved" Paper given at ETIC '77, Guildford. April 1977.

Miles, R. (1977) "Computers in industrial training and management development in the 1980s" National Development Programme in Computer Assisted Learning, London.

NDPCAL (1977) "Project summaries and program index" National Development Programme in Computer Assisted Learning. London.

11. PUBLICATIONS AND REPORTS FROM THE PROJECT

The following publications may be obtained from the Project price 50 pence each, to cover printing and postage. (Cheques and postal orders should be made payable to "Imperial College Computer Centre")

The CAL Bibliography (Microfiche). December 1980.

The CAL Bibliography KWIC Index (Microfiche). December 1980.

The CAL Package Index (Microfiche). December 1980.

The CAL Package Index KWIC Index (Microfiche). Reprinting.

Using the CALCHEM packages. (ICCC Bulletin) October 1978.

SAKI - Self Adaptive Keyboard Instructor. (draft ICCC Bulletin) November 1980.

TEACH-C, Computer Assisted Learning in Fluid Flow and Heat Transfer. (draft ICCC Bulletin) October 1980.

CEDAR "Teaching history and geography with a computer" Imperial College London. May 1978.

CEDAR "Computers in military training: A bibliography" Imperial College London. June 1978.

CEDAR "Computers in management and business studies: An index of CAL packages" Imperial College London. June 1978.

CEDAR "Computers in engineering teaching" Imperial College London. October 1978.

CEDAR "Computers in chemistry teaching: a bibliography and index of CAL packages" Imperial College London. July 1979.

CEDAR "Teaching biology with a computer: a bibliography and index of CAL packages" Imperial College London. April 1980.

CEDAR "Evaluation of CBL: a bibliography" Imperial College London January 1981

Rushby, N.J. "Computer based learning in the Soviet Union, a report on a study visit to Moscow" Imperial College London. April 1979.

Rushby, N.J. (Ed) "Educational computing in a university environment" Imperial College London. July 1978.

Fox, J., and Rushby, N.J. "Design considerations for CAL programs" Paper given at the Conference on Computers in Higher Education.

University of Lancaster. March 1978.

CALNEWS. A newsletter about CBL is published jointly by CEDAR and CET, three times each year and is available free upon request.

A number of other papers have been published in journals and are available through your institution or public library in the usual way. However, if you have difficulty in obtaining a copy, please contact CEDAR.

Rushby, N.J., James, E.B., and Anderson, J.S.A. "A three dimensional view of computer based learning in continental Europe" Programmed Learning and Educational Technology, Vol 15(2). 1978.

Fox, J., and Rushby, N.J. "Guidelines for developing educational computer programs" Computers and Education, Vol 3. 1979.

Rushby, N.J. "Getting Started with Computer Based Learning" Visual Education, March 1980.

Rushby, N.J. "Foci for Computer Based Learning in the United Kingdom" in Howe, A. (Ed) International Yearbook of Educational and Instructional Technology. 1980-81

Rushby, N.J. "Study Skills and Computer Managed Learning in the Soviet Union" in Howe, A. (Ed) International Yearbook of Educational and Instructional Technology. 1980-81

Rushby, N.J. "En Grande-Bretagne, les micro-ordinateurs et l'enseignement informatise" Education et Informatique, Paris. No. 1, April/May 1980.

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Morris, J. "The CEDAR Project" The Audiovisual Librarian, Vol 6, No 3, 1980.

Rushby, N.J. "Educational Paradigms" in 'From Books to Bytes" TV Ontario, Toronto, 1980.

Rushby, N.J. "The CEDAR Project" SIGCUE Bulletin, Vol 14, No 4, October 1980.

Rushby, N.J. "CBL in the UK: the direction of the art" Education Today. (in press)

Rushby, N.J. "Microcomputers in the classrooms in Continental Europe" (in press).

APPENDIX. USING THE CEDAR ON-LINE ENQUIRY SERVICE

1. THE CEDAR BIBLIOGRAPHY

The CEDAR Bibliography is a collection of references to books, papers and reports on educational computing. It includes references on computer assisted and computer managed learning, simulation, student record keeping, educational and management implications and some fringe references considered useful for CBL development. The references which currently number about 2500, are drawn from the UK, North America, Europe, the USSR, India, Australia and Japan.

The bibliographic references are held on a computer file as a series of lines of text, each 72 characters long (in the same way that a printed page is grouped into lines). Spaces are added to the end of the lines where necessary to make them exactly 72 characters long.

Each reference is preceded by an identifying line with the following format:

<R n>

where n is the reference number. The characters <R are in the first two positions in the line.

The rest of the reference is conveniently laid out as:

author on one or more lines
title on one or more lines
source on one or more lines

An example is:

```
<R  1079>
DUERDEN, F, POLLITT, A,A
      DISTANT OPERATION OF COMPUTER CONTROLLED ULTRAFICHE TERMINALS
      IN PROCEEDINGS OF THE 1974 INTERNATIONAL CONFERENCE ON FRONTIERS
      IN EDUCATION, IEE, LONDON 1974, PP 63-69.
```

2. THE CAL PACKAGE INDEX

The CAL package is intended to contain references to most of the CAL programs available in the UK. The initial sources include existing indexes, such as those mentioned above, and a number of program exchange catalogues. Additional information has been obtained from many educational computer centres which have supplied details of CAL programs in their libraries. Periodically, the index is brought up to date with details of new and changed programs.

The data held on each package is not exhaustive, but should be sufficient to enable a user to see whether it is likely to be suitable for his needs. It includes a brief description of the program with

the subject and type of student for which it was written. There are notes on the programming language and any special peripherals, eg graphics terminals, that may be used. Finally, the entry includes a contact address from which further details may be obtained.

The entries in the CAL Package Index are kept in the computer in a similar way to the CEDAR Bibliography. They are held as a series of lines; each is 72 characters long and each is preceded by an identifying line with <R n> at the beginning where n is the reference number. However, since rather more information is kept about each package, each section starts with a short title. Thus:

```
NAME:     SYMPHONIA
AUTHOR:   A.BLIN-STOYLE + D.SAVAGE
DESCRTN:  BUSINESS GAME IN WHICH MANAGEMENT DECISIONS ARE SUBMITTED
          FOR THE RUNNING OF A COMPANY FOR THE SIMULATED PERIOD OF 1
          MONTH. PROGRAM PRODUCES AN OPERATING STATEMENT FROM WHICH
          NEW DECISIONS CAN BE MADE
SUBJECT:  BUSINESS MANAGEMENT TERTIARY
DOCS:     SOME TEST DATA+SUPPORT
COMMENT:
LANG:     FORTRAN 4
CONTACT:  T.D.WALKER,DEPT OF MANAGEMENT AND BUSINESS
          STUDIES,BRIGHTON POLYTECHNIC,PRESTON ROAD,BRIGHTON
          TEL 0273 693655
```

3. SEARCHING THE CATALOGUES

The CEDAR Bibliography and the CAL Package Index are kept on the main Imperial College computer and may be interrogated from terminals within and outside the college using an enquiry program. This is designed to allow users to retrieve entries containing specific words or combinations of words and to print these on their terminals.

Before you can use this facility you will need a job number and password, together with the appropriate dial-up telephone number for the ICCC system. These can be obtained on application to CEDAR.

4. Logging on to the computer

Users who are familiar with the ICCC time-sharing system should skip to section 5.

Connect the terminal with the computer (by switching on-line or by dialling-in) and press the Carriage Return (CR) key. When the connection has been successfully made, the computer issues a header message of the form:

```
78/10/09. 11.06.58.
I.C.C.C. NETWORK OPERATING SYSTEM      NOS 1   430.3B
USER NUMBER:
```

This header message changes from time to time depending on the current system level.

Type in your user number on the same line and terminate the line with a carriage return (CR). The system then responds by typing:

```
********
```

Now enter your password over the blacked out area (to preserve privacy) and terminate with a carriage return (CR).

This dialogue may be speeded up by entering the user number and password together separated by a comma, for example:

```
USER NUMBER: umaav01, mypassw
```

However, this does not maintain password privacy unless the printer is switched off at a teletypewriter or the screen intensity is turned down at a vdu.

The system will check if the user number/password combination that has been entered is valid. When it has been validated, the system responds with the number of the terminal and the terminal type, for example:

```
TERMINAL: 222,TTY
```

You have now logged on successfully. When you have completed the terminal session you should disconnect from the system by entering the command

```
bye
```

followed by a carriage return. This disconnects the terminal (log-off) and issues accounting information of the form:

```
XXXXXnn      LOG OFF.          HH.MM.SS
X.XXXnn      CP                n.nnn     SEC.
```

where XXXXnn = the user number
HH.MM.SS = the time of day
n.nnn = the amount of central processor time used in the terminal session

If, during the log-on sequence, you type in the wrong user number or password or an empty line followed by a carriage return, the system will respond with the message:

```
IMPROPER LOG IN, TRY AGAIN
USER NUMBER:
```

Check carefully that you have entered your user number and password correctly, then re-enter them as before. If you enter an invalid user number or password four times, the system will respond:

```
ILLEGAL TERMINAL
```

and the machine will disconnect. If this happens you should contact the CEDAR Project.

5. RUNNING THE ENQUIRY PROGRAM

Once you have successfully logged on, you can invoke the enquiry program as follows (system output is in upper case, user responses in lower case)

```
              TERMINAL:     222,TTY
RECOVER/ SYSTEM: -search                    to begin searching the
                                            bibliography,   or
RECOVER/ SYSTEM: -package                   to begin searching the
                                            package index.

   ***** CEDAR DATABASE RETRIEVAL PROGRAM *****

PLEASE ENTER YOUR SEARCH DIRECTIVES

?                                           the question mark is the
                                            search program's invitation
                                            to enter the first directive
```

6. ENQUIRY PROGRAM DIRECTIVES

The enquiry program directives specify the words in which the user is interested and the combinations of words that will be used to select and list the references from the bibliography or package index. Each word or feature may be a word or a part of a word occurring somewhere in the catalogue, such as a particular topic (eg engineering, history) or the name of an author (eg Duerden, Savage). Each directive is given on a separate line and the complete set is ended by the directive FINISH. Once you have completed your enquiry, the program is terminated by entering STOP.

An example from the bibliography is:

```
   ***** CEDAR DATABASE RETRIEVAL PROGRAM *****

PLEASE ENTER YOUR SEARCH DIRECTIVES

? feature china
 FEATURE  1 IS CHINA
 DELIMITERS  ,. AND  ,.
? list
 LISTS REFERENCES CONTAINING ONE OR MORE OF THE FIRST  1 FEATURE(S)
? finish

<R    96>
DUBOIS, P H
      A TEST DOMINATED SOCIETY: CHINA, 1115 BC-1905 AD
      FROM PROCEEDINGS OF THE 1964 INVITATIONAL CONFERENCE ON TESTING
      PROBLEMS, EDUCATIONAL TESTING SERVICE, PRINCETON, NEW JERSEY,
      0-11.
```

As can be seen, each directive line starts with a special word (eg FEATURE, LIST) but the program is quite tolerant about the layout of the rest of the line and other words which are not strictly required may be included for clarity. For example, in the set above, the FEATURE line could have been entered as

```
? feature is china
```

After the directive has been read, the program replies with a description of the options selected or given by default (as in the LIST directive shown above). The directive lines may be entered in any order, but the last line of the set must be FINISH, and the program must be terminated with STOP.

6.1. The FEATURE directive

Each of the words in which the user is interested (features) is described by a separate FEATURE directive. This gives the group of characters that make up the feature and specifies the special characters (delimiters) that separate the feature from the surrounding text in any references. After FEATURE, the word IS may appear, but its presence is optional. Then follows the group of characters that make up the feature, for example:

```
? feature france
```

or

```
? feature is france
```

Each feature may be up to 20 characters long and up to 10 separate features may be specified.

After the feature itself, another optional word WITH can preceed DELIMITERS. The delimiters specification can consist of:

- the number of characters that can mark the start of the feature (normally between 1 and 20)
- the characters themselves with the letter 'B' used to denote a blank,
- the number of characters that can mark the end of the feature (normally between 1 and 20)
- the characters themselves. Again 'B' is used to denote a blank.

Sometimes the feature may be delimited by any character. For example, consider a search for the feature 'assist' appearing by itself or at the beginning of 'assistance' or 'assisted'. This case is specified by setting the number of delmiters after the feature to 0 (the characters themselves are not then given) as follows:

```
? feature assist delimiters 4 -B,. 0
```

The feature specified is thus ASSIST preceeded by either a hyphen, a blank, a full stop or a comma, and followed by any character. Similarly, the preceeding delimiter set can include all the characters by setting this number of delimiters to zero. If no delimiters are set, the program assumes blank, comma and full stop.
For example:

```
? feature assist
```

is equivalent to

```
? feature assist delimiters 3 B,. 3 B,.
```

6.2. The LIST directive

The LIST directive is used to instruct the program which references are to be listed. Several LIST lines may be specified for each run of the program, but at least one feature must be specified before any LIST directive is given. There are three forms of the LIST directive LIST OCCURRENCES, LIST COOCCURRENCES, and LIST feature numbers.

LIST OCCURRENCES produces a listing of all the references which contain any one or more of the features already specified. If more features are specified subsequent to LIST OCCURRENCES, they will not be included in the listing. If list is specified on its own, LIST OCCURRENCES is assumed.

LIST COOCCURRENCES produces a listing of references which contain all the features already specified. Again, any features specified subsequently will not be included.

As described earlier, the program gives each feature a number which is

printed as part of the response to a valid FEATURE directive. LIST feature numbers can therefore be used to select particular features and complex combinations of features. References containing the features specified will be listed and features can be excluded by prefacing the feature number with the word NOT. For example:

```
? list 1 3 not 4 and 5
```

will cause all references which contain features 1, 3 and 5 but not 4 to be printed.

6.3. FINISH and STOP directives

The FINISH directive completes the set of directives and tells the program to begin processing the selected catalogue.

The STOP directive, occurring at the start of any directive line will terminate the program immediately.

6.4. Example

The following example shows a complete enquiry session, including log-on, directive specification, listing and program termination.

The directive set specified, examines the bibliography for references concerning military projects, and for references to terminal development not carried out at Florida State University. Since the listing produced is quite lengthy, only a part of it is shown.

```
 80/05/20. 11.17.41
 I.C.C.C. NETWORK OPERATING SYSTEM.        NOS 1.1-430.8B
USER NUMBER: umsav01,mypassw
                          TERMINAL:        222,TTY
RECOVER/ SYSTEM: -search
   ***** CEDAR DATABASE RETRIEVAL PROGRAM *****

 PLEASE ENTER YOUR SEARCH DIRECTIVES

? feature army
 FEATURE  1 IS ARMY
 DELIMITERS  ,. AND  ,.
? feature navy
 FEATURE  2 IS NAVY
 DELIMITERS  ,. AND  ,.
? feature air
 FEATURE  3 IS AIR
 DELIMITERS  ,. AND  ,.
? feature defen delimiters 3 b,. 2 cs
 FEATURE  4 IS DEFEN
 DELIMITERS  ,. AND CS
? list occurrences
```

```
 LISTS REFERENCES CONTAINING ONE OR MORE OF THE FIRST  4 FEATURE(S)
? feature terminal delimiters 3 b,. 4 b,.s
 FEATURE 5 IS TERMINAL
 DELIMITERS  ,. AND  ,.S
? feature florida
 FEATURE  6 IS FLORIDA
 DELIMITERS  ,. AND  ,.
? list 5 but not 6
 LIST REFERENCES CONTAINING FEATURES
                                    5 NOT  6
? finish


<R    27>
BAYROFF, A G, ROSS, R M, AND FISCHL, M A
      DEVELOPMENT OF A PROGRAMMED TESTING SYSTEM
      ARMY RESEARCH INSTITUTE FOR THE BEHAVIOURAL AND SOCIAL SCIENCES
      AD A001534-7, DECEMBER 1974.

<R    62>
CARSON, S B, GRAHAM, L L, HARDING, L G, JOHNSON, K A, AND MAYO, G D
     AN EVALUATION OF COMPUTER MANAGED INSTRUCTION IN NAVY TECHNICAL
      TRAINING
      NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
      AD A012638-3, JUNE 1975.

<R  1482>
BUTLER, P, AND MARTIN, I
      THE USE OF A GRAPHICS TERMINAL AS AN AID TO TEACHING FIELDS
      INTERNATIONAL JOURNAL OF ELECTRICAL ENGINEERING EDUCATION, V.15,
      1978. PP 173-177.

***** END OF DATABASE

***** CEDAR DATABASE RETRIEVAL PROGRAM *****

PLEASE ENTER YOUR SEARCH DIRECTIVES

? er
```

7. ADDING TO THE CATALOGUES

Both the CAL Bibliography and the Package Index are being continually updated with additional references and users are urged to help enlarge the catalogues by advising CEDAR of any new and useful references they find. Coding forms for bibliographic references can be used for collecting the relevant information and are available from CEDAR.

Bibliography ref no: 15
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BRODERICK, W A INSTRUCTIONAL DEVELOPMENT FOR THE FLORIDA PLATO PROJECT: PROCESS AND EVALUATION CENTRE FOR EDUCATIONAL DESIGN, FLORIDA STATE UNIVERSITY, TALLAHASSEE, PART IV OF THE SYMPOSIUM: THE FLORIDA PLATO PROJECT, ANNUAL MEETING OF THE AMERICAN EDUCATIONAL RESEARCH ASSOCIATION, WASHINGTON, D C, APRIL 1975.

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Bibliography ref no: 124
GRONLUND, N E MEASUREMENT AND EVALUATION IN TEACHING NEW YORK, MACMILLAN, 1965.

Bibliography ref no: 156
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